



Research Institute, Pusa

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NOTE                      THE EXTENSION OF CULTI  
VATION OF FIBRE PLANTS  
IN INDIA



CALCUTTA  
SUPERINTENDENT GOVERNMENT PRINTING, INDIA  
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## PREFACE.

THE information in this note has been chiefly given by a Committee consisting of Messrs. Gammie, Burkill, Finlow, Clouston and Subba Rao, at the meeting of the Board of Agriculture held at Pusa in 1908. It was subsequently slightly amplified by the Committee on information obtained by me from the Directors of Agriculture of the various Provinces. I consider this information to be of great value.

I have endeavoured to condense the reports as received, in consecutive form, and, to some extent, have edited them, but I take no personal credit for the information. I have pleasure in acknowledging, in the interest of my Department, the many practical suggestions which have been made.

I also wish to say that I believe extended cultivation of some fibre plants will materially improve the prosperity of a good many of the agriculturists in India, and that this is one reason why the note, if translated simply into the vernaculars, will probably produce valuable results.

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*Inspector-General of Agriculture  
in India.*

*2nd July 1909.*



# NOTE ON THE EXTENSION OF CULTIVATION OF FIBRE PLANTS IN INDIA.

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1. The Committee limited consideration to particular crops:—

- (1) Ryot's crops—Jute, *Hibiscus cannabinus*, *Crotalaria junccea* and Coconut.
- (2) Capitalists' crops—Rhea, Agave, Pine-apple, Sansevieria and Flax.
- (3) Fibres worth experimental attention, *e.g.*, Plantain, Malachra and Sida.

2. At present the cultivation of jute is practically confined to Bengal and Eastern Bengal and Assam.

**Jute in Bengal and Eastern Bengal and Assam.**

In both of these Provinces, it is one of the most important crops, and its cultivation has increased rapidly, owing to

high prices during recent years. While there is little doubt that, in some districts, jute has replaced rice to a certain extent, the ryots who grow jute now generally know that paddy or a *rabi* crop can usually be grown in the same field in the same year. This should be considered by those who think that the extension of the cultivation of jute would seriously interfere with the food-supply of the country, for, on the other hand, the little diminution in outturn of rice caused by increase of jute is more than compensated by the increase of the buying capacity of the country on the return of the more profitable crop.

3. The cultivation of jute is extending in Assam and is very profitable there. Large areas of virgin land are available for the crop. Its cultivation increased rapidly in Behar during the years 1904-1907 when prices

**The cultivation of jute is extending to new areas.**

were high; but latterly the area has largely decreased. Its place in the crop rotations of this tract is still indefinite.

4. During the last four years, trials with jute have been made in other parts of India. The results of the experiments indicate that jute might be grown successfully in—
- Experimental trials of jute in other parts of India.**

(a) The Deltas of the Godavari and Kistna	}	Madras.
(b) The Malabar Coast		
(c) The Chhattisgarh and Nagpur Divisions (with irrigation)	}	Central Provinces.

5. In the Madras Presidency, a number of private land-owners are trying jute in small areas on the Malabar Coast districts. Experiments in the Kavery delta have been abandoned, as want of skill on the part of the cultivators and the remunerativeness of paddy augured no success. The same causes will probably hinder progress in the Godavari and Kistna deltas.
- Experiments in Madras.**

6. In the Central Provinces, the crop will continue to be grown on demonstration plots. Its cultivation will probably be limited to tank-irrigated areas where it may possibly alternate with wheat, the latter being a dry *rabi*-season second crop.
- Experiments in the Central Provinces.**

7. In Bombay, the experiments were not successful, and the crop is not likely to be introduced successfully anywhere in the Presidency.
- Experiments in Bombay.**

8. It is not likely that jute can be profitably grown in the irrigated districts of the Punjab, unless practical arrangements can be made for retting the crop. Tanks filled from the canals would, as a rule, be required.
- Experiments in the Punjab.**

9. In the United Provinces of Agra and Oudh there does not seem to be, at average prices, much room for this crop in the districts served by the canals, and if the crop is grown to any extent, difficulties may arise, as in the Punjab, in making proper arrangements for retting.
- Experiments in the United Provinces.**

10. Jute has been successfully cultivated in the lands belonging to the Maubin Jail in the Irrawaddy delta for a number of years. But although this success has been duly advertised, and quantities of seed have, from time to time, been distributed to other parts of Burma, the experiments have failed to induce general cultivation. The crop has not become popular in Burma probably on account of the dearness of labour and the extra trouble involved in its cultivation as compared with paddy. A number of private individuals have, however, taken up jute cultivation in an experimental way. The suitability of the crop for Lower Burma will be particularly studied at the Thuawbi Agricultural Station, especially in regard to the right times of sowing, the varieties which can be most profitably grown and the possibility of growing rice and jute on the same land in the same year. It is believed that the development of jute cultivation on any commercial scale will depend on the erection of a Jute Mill in Rangoon or any other convenient centre, but the cost of labour in Burma, as compared with India, may form a serious commercial disadvantage.

11. *Hibiscus cannabinus* (Ambadi, Mestapat, Gogu, Sankukra)—  
 This plant is cultivated in many parts of India as a mixed crop, but rarely as a pure crop excepting on the East Coast of Madras and, to some extent, in the jute-growing districts of Bengal. It grows excellently on well drained land in a wet climate such as may be found in the jute districts, but it is capable also of thriving under conditions which would not suit jute without irrigation. In this last fact lies the importance of the plant. There is no advantage to be got by extending its cultivation where jute will easily thrive; but in regions of more moderate rainfall the cultivation of *Hibiscus cannabinus* might profitably be extended.

12. In Madras, its cultivation is firmly established in Vizagapatam and Guntur, which include  $\frac{2}{7}$ ths of the total acreage of the crop in the Presidency (68,000 acres in 1906-07). In 1907-08, when the total acreage was 71,476, it was in these two districts 60,629 acres. It



has been suggested that the quality of the fibre has deteriorated, but enquiries made on the spot in 1906 indicated that the alleged deterioration is due to fraudulent watering and to carelessness in preparation owing to high prices, rather than to any actual deterioration of the plant. Prices have recently been low. A mill for spinning this fibre and manufacturing it into gunnies, has been worked for some years at Binlipatan, which probably accounts for the considerable area under the crop in the Vizagapatam District. Another mill has recently been opened at Ellore in the Kistna District and may encourage extended cultivation.

13. The total acreage under this crop in 1906-07 in the Bombay Presidency was said to be 145,623, but for 1907-08 only 97,821 acres are recorded. It is generally mixed with other *kharif* crops, and is remunerative chiefly because the fibre is used for well ropes and other home purposes.

14. In the Central Provinces, it is grown in mixed crops. Its fibre is considered inferior to that of *Sann* (*Crotalaria juncea*). The general opinion is that *Sann* gives a better outturn of fibre and a greater profit per acre when each crop is planted alone.

15. The extent of this crop as a mixture in other crops in the United Provinces is not known. It is usually grown as a border crop, and calculations regarding areas and outturn are very uncertain. The fibre obtained in the east of the United Provinces is perhaps of better quality than that grown in the west.

16. It occupies in the Punjab an insignificant area. It is frequently grown as a border crop round sugarcane, cotton and maize, as a protection against straying cattle. It is grown in separate plots. The produce is chiefly used locally.

17. It is cultivated, to some extent, throughout Upper Burma. It is not likely in the near future to have any particular commercial importance. The total area is at present about 10,000 acres.

18. *Crotalaria juncea*.—The fibre of this crop does not compete with jute as does that of *Hibiscus*  
**Sann-Hemp—General remarks.** *cannabinus*, but in market value it is superior to both. Sann-hemp can best be

grown in districts of moderate rainfall, and, therefore, does not compete with rice. It is, in some parts of India, frequently grown as a green manure crop before rice, and in others as a second crop in the same year after early rice for fibre. This rotation is advantageous, because sann is a leguminous crop.

19. The total acreage under the crop in the Bombay Presidency in 1906-07 was 23,700 acres and in 1907-08, 25,470 acres. It is chiefly grown as a *khurif* crop for fibre, but also to a considerable extent as a green manure crop. In the Thana District, it is grown as *rabi* crop in succession to early rice for fibre, which is used in making twine for nets by the fisherman.

20. The returns for Madras give a total of over 500,000 acres; but it is known that only a very small proportion of this—a few thousand acres—is grown for fibre. It is most extensively cultivated for fibre in the Northern Circars, chiefly in the Amalapuram and Narsapur Taluks of the Godavari and Kistna Districts. In the rest of the Presidency with the exception of the Tinnevely District, where some fibre is manufactured into extremely durable gunny bags, the cultivation of the crop is confined to the production of fodder.

21. In Eastern Bengal and Assam this crop is largely grown in the Serajganj sub-division of the district of Pabna where the estimated area is 33,900 acres. Generally it is grown in Serajganj on land which bears a jute crop in the same year. The area in Chittagong where it is also grown as a *rabi* crop, decreased from 7,900 acres in 1906-07 to 1,600 acres in 1907-08. The total estimated area in Eastern Bengal and Assam is about 42,000 acres and the estimated export of the fibre is 30,000 maunds. In this Province jute is much more important, but it is possible that the cultivation of Sann-hemp can be somewhat extended with profit, though as the water supply for retting is limited in February and March, the months of its cutting, this would only be along the

banks of rivers. In the Serajganj sub-division it is only grown for fibre quite close to water.

22. A note by Mr. Clouston, Deputy Director of Agriculture in the Central Provinces, on the cultivation of fibre plants in the Central Provinces, has been published in the *Agricultural Journal of India* (April 1908). The total area under *Sann* in the Central Provinces was 55,400 acres in 1907 which increased in 1908 to 85,044 acres. In Berar in 1907 the acreage was 52,360 and in 1908, 35,484. It is always grown as a pure crop and is cultivated for its fibre chiefly, while the seed is a valued cattle food. It is generally believed that only one variety of *Sann* is grown throughout the Central Provinces and Berar. Retting costs a good deal. A suitable cheap machine to extract the fibre might be advantageous in extending the cultivation. The area in the Central Provinces has been nearly doubled during the last ten years. *Sann* cultivation is so profitable that the crop has been largely substituted for wheat. The cultivators understand that this crop is a hardy one and improves the condition of the land. It is grown to a small extent as a green manure crop, particularly for irrigated wheat and sugarcane. In the cotton tracts no extension of this crop can be expected, as cotton pays better. In the rice tracts, *Sann* could probably be profitably grown on much of the land which is planted with other second crops. The total quantity of *Sann*-hemp exported from the Province and the value of the same from 1904 to 1906 are shown below:—

Year.	Mamads.	Value.
		Rs.
1904-05 . . . . .	228,751	12,18,783
1905-06 . . . . .	201,102	10,82,534
1906-07 . . . . .	168,086	9,03,313
1907-08 . . . . .	271,727	14,60,532

23. In the Panjab there were 57,000 acres under Sann-hemp in 1906 and 52,400 acres in 1908; the sub-montane tracts showed the greatest area.

**Cultivation in the Panjab.**

Very little is grown in the south-west of the Province. Throughout the Panjab, the crop is usually sown in very small plots, and very little is marketed. The crop is sown almost solely for fibre, but in the Hoshiarpur District, it is estimated that 1-10th of the crop was grown for green manuring. The practice of green manuring with *Sann* is, however, rare at present. The retting and cleaning of the fibre are regarded as very tedious and troublesome processes. Having regard to these troubles the crop is considered to be less remunerative than some other crops. The imports of Sann-hemp fibre into the Panjab in 1906-07 were 15,382 maunds and in 1907-08, 20,984 maunds, almost entirely from the United Provinces. The exports amounted to only 4,078 maunds in 1906-07 and 2,581 maunds in 1907-08.

24. The returns of the United Provinces show an area in 1906-07

**Cultivation in the United Provinces.**

of 133,000 acres of hemp, which include both *Hibiscus cannabinus* and Sann-hemp; and in 1907-08 of 158,000 acres. Practically the whole of this area is devoted to Sann-hemp. It is grown for fibre and almost universally as a border crop with *khari* crops, the produce being worked up by cultivators into ropes for home use. The export is, therefore, a small part of the produce. The trade returns of the United Provinces for 1906-07 show practically no imports of hemp, but exports aggregating 400,000 maunds valued at 22 lakhs of rupees and in 1907-08 of 409,800 maunds, valued at Rs. 26,17,000; most of this is Sann-hemp. There is a steady trade to Calcutta and a very fluctuating trade to Bombay. The crop is a well-recognized feature of the local agriculture, and the trade in fibre is an organized one. The area generally responds to the prices offered.

25. The crop does well in the Tavoy District of Tenasserim. It is grown there after paddy. The esti-

**Cultivation in Burma.**

mated area is about 400 acres in Lower Burma. The fibre is used for fishing nets. It is very doubtful whether there will be any great development of it, unless the Department of Agriculture, Burma, succeeds in introducing it for green manuring.

26. The coconut palm is grown in all the Coast districts of India, but to the largest extent, in the southern portion of the Bombay Presidency and in Madras. In the Malabar Coast districts, the coir industry is a very large one, amounting to many lakhs of rupees per annum. Although this palm takes time to mature, its cultivation is popular, because it supplies food as well as fibre for many years after it has reached the fruiting stage.

**Coconut Fibre—General re-**  
**marks.** 27. In Bengal, it is plentiful in the lower Gangetic basin; but it exists practically only in garden cultivation; there are no large plantations.

28. The coconut palm is grown on a large scale in Bakhraganj and Noakhali in Eastern Bengal and Assam, but the fibre is never extracted. There seems no reason why this industry might not be introduced with profit into the Province.

29. Little, if any, attention has in the past been devoted to the fibre of the coconut in Burma, except in the jails. Even for food purposes coconuts have to be imported largely. The cultivation of the palm for fruit and fibre has been taken up in Akyab by one European. If he succeeds his experience may attract attention to this crop. There is a coir factory in Rangoon, and the collecting of coir for it would seem deserving of encouragement. The want of sufficient cool labour in Moulmein and other centres, makes it impossible to start coir factories in them. The total area under this crop was returned as 13,590 acres in 1906-07, and 13,070 acres in 1907-08.

30. There are possibilities of a useful industry in plantain fibre. In many parts of India the plantain is common in every garden; and in Bengal, Assam, the Bombay and Malabar Coasts, the Delta tracts of Madras and in parts of Burma, whole groves of plantains are quite common. The fibre of the plant which produces good fruit in India is usually, however, far inferior to that of *Musa Textilis*—also a plantain—which is the source of Manila Hemp. Moreover the amount of fibre obtainable from a plantain in India is very small. Experiments have shown that the

**Plantain Fibre—General re-**  
**marks.**

fibre can be extracted by a simple hand machine; but, in view of the low market price obtainable—as a rule, not much more than half that of Manila Hemp—it remains to be proved that a plantain fibre industry in India is a commercial possibility. The fibre is of little use for the manufacture of cordage as its strength is below the standard usually demanded for rope making.

31. There are about 124,000 acres under plantains in Burma, but nothing is done with the fibre. The crop might give paying results for fibre after producing fruit.
- The crop in Burma.**

32. Species of *Sida* are quite common jungle plants in most parts of India; but in order to attain the length necessary for a fibre plant the crop must be grown on well drained land, either in a moist climate or under irrigation. Experiments under these conditions have given promising results. It is, however, necessary to overcome certain difficulties before recommending the crop for general cultivation.
- Sida*.**

33. For the purpose of this note, Agave and Rhea may be taken together. The conditions of soil and climate suitable for these crops are now fairly definitely known. It used to be thought that Agave would grow and thrive on any soil and under any conditions of climate. It has, indeed, been stated that the poorer the land, the better Agave will thrive; but experience indicates that both Agave and Rhea require good land for rapid growth. For the latter also fairly heavy rainfall is required.
- Agave and Rhea—General remarks.**

Although it is possible to extract both Agave and Rhea fibre by hand, the products obtained are usually inferior to those obtained by machinery. Therefore possibly the cultivation of these plants should, for some time, be continued by capitalists who can afford to pay for expensive fibre extractors. Rhea has been extensively cultivated on the estates of Indigo Planters in Behar, but has not proved a profitable crop. Both Agave and Rhea require some years' growth before they give any considerable yield of fibre, a fact which discourages the ordinary ryot from attempting their cultivation.

34. It has been practically proved that the climate of Behar with a rainfall of 45 inches is too dry to admit of a sufficient number of cuttings being made per annum to make rhea pay. The results of the recent experiments at Dalsing Sarai and elsewhere have been set forth excellently by Mr. B. Coventry in the *Agricultural Journal of India*, 1907, pages 1-14. This crop thrives in the moist climate of Assam where it is possible to obtain five cuttings per annum and where, to a small extent, it is a ryot's crop.

36. In Madras, rhea is grown on a small scale in the Shevroys. The Glenrock Company opened a rhea plantation near Metapolliam in the Coimbatore District, but did not make a profit out of the cultivation.

37. In Bombay rhea has been under experimental trial for many years, and further recent experiments with it at the Ganeshkhind Gardens, Kirkee, have confirmed the conclusion that the soil and climate of the Deccan are unsuitable for the plant under ordinary circumstances.

38. It is said that in Lower Burma, a variety of the plant grows wild on the banks of streams in the Tharrawaddy District along the foot of the Pegu Yoma range, and that the fibre is used to make twine for fishing lines. Experimental plantations of *B. nira* and *B. tenacissima* have been started by the Forest Officer in Tharrawaddy, who reports that the latter species is growing with success. Rhea grows wild both in the Northern and Southern Shan States. The fibre is chiefly used for making paper, but is also made into cloth and strong twine for fishing lines, etc. Two varieties of the plant are known, one being considered better than the other for the above purposes.

39. Agave grows in most parts of India, on all classes of soil and under various conditions of climate. It yields the largest, quickest and most profitable returns under careful cultivation on good land in a moist climate.

**Agave—General remarks.**

40. In Assam only one plantation (Dauracherra Fibre Company, Sylhet) has existed long enough to yield definite results, and these do not prove that Agave cultivation in Assam is certain to be a profitable industry.

41. A few plantations of Agave exist in the United Provinces, but have hardly reached the cutting stage. The raw material which is at present dealt with is chiefly obtained from railway fences taken on lease.

42. The only place in the Madras Presidency where Agave fibre has been extracted on a commercial scale is in the Coimbatore district from the plants growing along the railway lines. This species proves to be *Agave vera-cruz*. Several European planters are trying Sisal in the planting districts, and the Madras Fibre Company has some plantations in the Anantpur and Chingleput Districts. The cultivation of Agave is not likely to be taken up in the near future by ordinary ryots. The extraction of the fibre by hand is unpleasant on account of skin irritation caused by the sap. The chief purpose of the Hindupur Government plantation is to grow Agave experimentally on land where the rainfall is too precarious for other crops. It is also intended to supply Sisal plants to those who are interested in the cultivation of this plant.

43. Agave has been but little exploited in the Central Provinces, and the cultivation is not likely to become popular. The common species there is *Agave cantala*. It is usually grown in hedges, around groves and gardens, but nowhere in abundance. Fibre is not extracted from it extensively. In the Kawardha Feudatory State adjoining Bilaspur, its cultivation is fairly large, and the fibre is used in making ropes and cloth. The labour involved in extracting the fibre is considered both hard and degrading, while the juice of leaves produces eczema on the legs and arms of the labourers. Agave cultivation has been extended of late at the jails in the Central Provinces, and the Inspector-General of Prisons had 87,459 aloeas planted out last year in his various gardens. At these jails, all the work of cultivation, of extracting the fibre and of making it into ropes, rugs, etc., is done



by the prisoners. This industry engages labour at all times of the year. On the *bhata* plains of Chhattisgarh where there are very large areas of waste land, it may be possible to start aloe plantations; but if this is to be done successfully, the work will have to be undertaken by an enterprising firm with sufficient capital and practical knowledge. It has yet to be proved that the aloe can be profitably grown for commercial purposes on such soils without irrigation. Experimental trials are being made.

44. So far as is known, the *Agave vera-cruz* is the only *Agave* found in Burma. It is not systematically cultivated for its fibre, though it is used in some prisons for rope making. It is not yet certain whether *Agave* would repay cultivation, and in any case a better species than *Agave vera-cruz* should be grown.

45. The extraction of fibre from pine-apple is not likely to become an extensive enterprise in any part of India. *Sansevieria* has been repeatedly tried by planters in Assam, but without paying results. It is possible that fibre can be profitably obtained from the pine-apple in Southern India.

46. Flax as a fibre crop is not yet produced on a commercial scale in India. Extensive experiments are in progress in Bengal. These experiments were begun about four years ago.

**The prospects of Flax as a fibre crop in India.** They will, when complete, probably indicate that fibre of good quality can be profitably produced from this crop in several parts of India. There are large areas under linseed in the different Provinces, and in some places where the conditions are specially favourable it may be possible to produce good fibre as well as seed. In other tracts the coarse stem of the country linseed may yield fibre which is inferior but still worth extracting. Experiments are, however, required to determine this, and also to show how such fibre can best be utilised.

17. Flax cultivation has no particular prospect of success in the United Provinces, except perhaps in a few favourable localities and unless the growers can afford to stack their straw until clean water is available.

48. Except on the Dharwar Farm, the different varieties of imported flax have not yet been found suitable for cultivation in the Bombay Presidency.

**Flax in Bombay.**

49. It has so far not succeeded in Burma, but no very systematic experiments have yet been made.

**Flax in Burma.**

50. In the Punjab, 39,874 acres of linseed were sown in 1906-07, 14,669 acres being in the Kangra district and most of the balance in the sub-

**Flax in the Punjab.**

montane districts; but in 1907-08 only 29,348 acres were sown. The crop is grown for seed. It is thought that good material for fibre has been obtained from trials made with Russian linseed. But the difficulty lies in the retting, and this is being studied at Lyallpur. Experiments which were conducted many years ago were well reported on as regards the growth of the plant. The retting question was not then fully examined. The local variety of the Punjab is not suitable for fibre purposes, owing to its established habit of short and bushy growth.

51. The Bengal Agricultural Department tried *Malachra capitata* at Cuttack, but gave it up as hopeless after two years' trial. Similarly

**Malachra capitata.**

experiments conducted at the Rajshahi Experiment Station in Eastern Bengal and Assam, indicated that its cultivation is not likely to be profitable. Experiments have not yet been made in other Provinces.

52. The Committee believes that it is possible to extend largely and profitably in the immediate future,

**General conclusions.**

the cultivation of jute, sunn-hemp and *Hibiscus cannabinus*, and that later on, it is possible that a portion of the linseed grown over large areas in various parts of India, may be utilized for the production of fibre as well as seed. A considerable increase of Agave cultivation is possible in Assam and in tracts which have similar physical and climatic conditions. Successful rhea cultivation must apparently be limited to a comparatively narrow zone where both climate and soil are particularly suitable. The Committee affirms that jute is a very paying crop, and believes that it can usually be followed by a food crop in the same year.

The Committee lays great stress on so arranging the rotation of food and fibre crops that the encouragement of the latter shall not be at the expense of the former. From this point of view, those fibre crops, which occupy the ground for one season only, are preferable to those of a perennial nature.

The Committee believes that the demand for fibres is bound to increase, as they are essential for nearly all branches of trade, also that it is not likely that prices will fall so low as to render fibre cultivation in India unremunerative.

